

PATENT ABSTRACTS OF JAPAN

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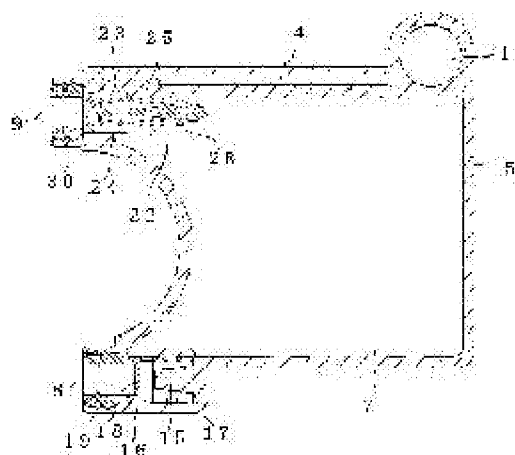
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(54) INK CARTRIDGE FOR INK JET RECORDER, AND INK JET RECORDER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a removable ink cartridge in which leakage of ink or volatilization of ink solvent can be prevented.

SOLUTION: A basic body 5 having a large ink storage chamber 7 is provided with an ink supply opening 8 having a valve element 18 for normally sustaining a closed state by means of a spring 17 and opening through connection with a recording head, and a valve element 26 for normally sustaining a closed state by means of a spring 24 and opening through connection with the recording head so that the large ink storage chamber 7 communicates with the atmosphere.



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CLAIMS

[Claim(s)]

[Claim 1] The ink cartridge for ink-jet recording apparatus in which the atmospheric-air free passage end connection equipped with the valve element to which the ink feed hopper equipped with the valve element which always maintains a clausilium condition with a spring, and opens by connection with said recording head, and supplies ink to said recording head always maintains a clausilium condition to the base with which the ink room was formed with a spring again, and opens to it by connection with said recording head, and makes it open said ink room for free passage to atmospheric air is formed.

[Claim 2] The ink cartridge for ink jet recording apparatus according to claim 1 constituted by closing with the film with which said ink room formed in one field of said base the crevice which carries out opening, and transformed said crevice in response to the pressure fluctuation of ink, and was equipped with air barrier property.

[Claim 3] The ink cartridge for ink jet recording apparatus according to claim 1 by which said atmospheric-air free passage end connection is opened ahead of said ink feed hopper in the process connected to said recording head.

[Claim 4] The ink cartridge for ink jet recording apparatus according to claim 1 currently opened for free passage by atmospheric air through the capillary which said atmospheric-air free passage end connection closed with the film the rill formed in the front face of said base, and was formed.

[Claim 5] The ink cartridge for ink jet recording apparatus according to claim 4 connected through the passage equipped with the gap of extent where said capillary and said atmospheric-air free passage end connection hold ink according to the capillary tube force, and do not make ink reach said capillary.

[Claim 6] The ink cartridge for ink jet recording apparatus according to claim 4 by which the edge of said capillary is connected to the ink trap room by which the closure was carried out with the water-repellent film.

[Claim 7] The ink cartridge for ink jet recording apparatus according to claim 6 in which said water-repellent film has the water-repellent force higher than the meniscus holding power of the nozzle orifice of said recording head.

[Claim 8] The ink cartridge for ink jet recording apparatus according to claim 1 by which the areole which are open for free passage to said ink feed hopper are formed in the field which serves as the lower part when it connects with said recording head.

[Claim 9] The ink cartridge for ink jet recording apparatus according to claim 1 by which the coil spring which the tubed part which it has focusing on the truncated conic spring receptacle section is formed in said ink feed hopper, and was guided to said spring receptacle section is loaded with the valve element of the shape of a cylinder equipped with the bridgewall energized at the ink feed hopper side.

[Claim 10] The ink cartridge for ink jet recording apparatus according to claim 1 in which the valve element which the tubed part which opens for free passage to said capillary by the through tube, and carries out opening to said ink room side was formed in said atmospheric-air free passage end connection, and was energized with the coil spring in said opening by the method of

outside is inserted.

[Claim 11] The ink feed hopper equipped with the valve element which always maintains a clausilium condition to the base with which the ink room was formed with a spring, and opens to it by connection with said recording head, and supplies ink to it at said recording head Moreover, the ink cartridge for ink jet recording apparatus in which the atmospheric-air free passage end connection equipped with the valve element which a clausilium condition is always maintained [valve element] with a spring, and it opens [valve element] by connection with said recording head, and makes atmospheric air open said ink room for free passage is formed, The actuation member which makes each of said valve element open when equipped with said ink cartridge, The ink jet recording device which consists of a connection unit equipped with the differential pressure regulating valve which opens in the middle of the passage which is open for free passage to said ink feed hopper, and supplies ink to said recording head when said recording head side becomes predetermined negative pressure.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the removable ink cartridge which supplies ink to the recording head which carries out the regurgitation of the ink droplet corresponding to a printing signal.

[0002]

[Description of the Prior Art] For example, ink is held, the ink feed hopper of the container which is open for free passage to atmospheric air is equipped with tubed packing, and the ink cartridge which held the solid sphere which is always ****(ed) by means of a spring by the front face by the side of the ink room of tubed packing, and retreats by insertion of a tubed splicer is proposed in the ink cartridge which supplies ink to a recording head from an ink room through the splicer and packing which are open for free passage to a recording head so that JP,5-229137,A may see.

[0003]

[Problem(s) to be Solved by the Invention] Although according to this an ink feed hopper is closed by the solid sphere and leakage **** of ink can be prevented, even when the ink cartridge with which the recording head was once equipped is removed from a recording head, since a container is opened for free passage by atmospheric air, ink oozes out and there is a problem that the vaporization of ** and an ink solvent arises. The place which this invention is made in view of such a problem, and is made into the purpose is offering the ink cartridge which ink's begins to leak and can prevent the vaporization of ** and an ink solvent.

[0004] Moreover, other purposes of this invention are offering the ink jet recording device which performs record actuation to a recording head in response to supply of ink from the above-mentioned ink cartridge.

[0005]

[Means for Solving the Problem] In order to solve such a technical problem the ink cartridge of this invention The ink feed hopper equipped with the valve element which always maintains a clausilium condition to the base with which the ink room was formed with a spring, and opens to it by connection with said recording head, and supplies ink to it at said recording head Moreover, the atmospheric-air free passage end connection equipped with the valve element which a clausilium condition is always maintained [valve element] with a spring, and it opens [valve element] by connection with said recording head, and makes atmospheric air open said ink room for free passage is formed.

[0006]

[Function] In the condition of having been removed from the recording device, where the ink room was maintained by the seal condition by the valve element and a recording device is equipped, a valve element opens and an ink room becomes possible [atmospheric air being open for free passage, and supplying ink to a recording head from an ink feed hopper].

[0007]

[Embodiment of the Invention] Then, based on the example illustrating the detail of this invention, it explains below. Drawing 1 and drawing 2 show one example of the ink cartridge of

this invention with the structure of that front flesh side, respectively, and in parallel with the crevice 2 which carries out opening to one field, and the field of this opening, an ink cartridge 1 forms the ink stockroom 7 with the base 5 equipped with the upper part and the guide sections 3 and 4 which project in the path of insertion, and the film 6 which closes a crevice 2, and is constituted. The ingredient which the film 6 was deformable and equipped with air barrier property and an adhesive property by the pressure fluctuation of ink is chosen.

[0008] When a recording apparatus is equipped, the atmospheric-air free passage end connection 9 which the ink feed hopper 8 loaded with the valve mechanism mentioned later mentions later in the upper part again is formed in the location used as the lower part. The rill 10 which end 10a is punctured by the front face of the base 5 which constitutes the pars basilaris ossis occipitalis of a crevice 2 on the side face of a base 5, and other end 10b connects to crevice 11a of a major diameter moves in a zigzag direction, and is formed. Frame part 11b to which the path became thin a little is formed in the crevice 11 so that drawing 1 (b) may see, and it is divided into it with crevice 11a of the major diameter which sticks or welds breathable film 11c which has water repellence to ink here, and serves as an ink trap. As for breathable film 11c, it is desirable to have consisted of porosity films of resin [for example,] fluoride, and to have 3000 thru/or the water-repellent force 5000Pa or more higher than the ink holding power of the meniscus of the nozzle orifice of a recording head. The closure of the exposure of these rills 10 and a crevice 11 is carried out with the film 12 equipped with air barrier property and an adhesive property, and a rill 10 constitutes a capillary, and the crevice 11 constitutes the ink trap.

[0009] The crevice 11 for a free passage is connected to the free passage room 13 formed near the atmospheric-air free passage end connection 9 through the crevice 14 for connection. The crevice 14 for connection and the free passage room 13 are formed in the cross-section dimension which can secure the gap of extent returned to the free passage room 13 according to a water head difference with the liquid ink side of the ink stockroom 7, even if ink does not arrive at a crevice 11 at least according to the capillary tube force, and it obtains all of a sudden desirably and ink flows into a crevice 11.

[0010] The valve element 18 which the cross-section structure of an ink cartridge mentioned above is shown, the tubed part 16 which it has focusing on the truncated conic spring receptacle section 15 is formed in the ink feed hopper 8, and drawing 3 was energized by the coil spring 17 guided to the spring receptacle section 15 at the ink feed hopper side, and was always ****(ed) by packing 19 is inserted in movable, and the above-mentioned packing 19 which falls out to an ink feed hopper side, and serves as a stop member is fitted in. And the through-hole 20 which is open for free passage in the ink hold room 7 where a valve element 18 is forced on the spring receptacle section 15 is drilled by this tubed part 16.

[0011] A valve element 18 forms bridgewall 18b in barrel 18a which slides on the inside of a tubed part 16, and its center section, as shown in drawing 4 , and the actuation lever and the spring receptacle section 15 from a recording head side are constituted by bridgewall 18b possible [contact].

[0012] On the other hand, through opening 21, the tubed part 23 which is open for free passage in ink storage Omuro's 7 upper part with a through tube 22 again is formed in the free passage room 13, the valve element 25 energized with the coil spring 24 by the method of outside is inserted in it, and the packing 30 which falls out to an opening side and serves as a stop member is fitted in the atmospheric-air free passage end connection 9.

[0013] As shown in drawing 4 (b), a valve element 25 The actuation lever 26 which can be inserted in opening 22, Consist of a pressure receiving member 27 and a seal member 28, and fitting of the seal member 28 is carried out to annular crevice 26b formed in major diameter 26a of the actuation lever 26. After making opening 22 penetrate thin diameter section 26c from an ink hold room side and inserting a coil spring 24 in thin diameter section 26c, it is incorporated by fixing a pressure receiving member 27 at the tip of a thin diameter section.

[0014] In addition, if the bore of opening 22 is formed smaller than the outer diameter of the seal member 28 more greatly than the outer diameter of major diameter 26a of the actuation lever 26, where the actuation lever 26 is inserted in opening 22, the seal member 28 can be fitted in

an ink room side, and a coil spring 24 can be inserted in from the atmospheric-air free passage end-connection 9 side, and a pressure receiving member 27 can also be fixed.

[0015] It is constituted so that drawing 5 may show one example of the connection unit suitable for the ink cartridge mentioned above, this connection unit 31 may be connected to an ink cartridge, and atmospheric air may open the up space of the ink reservoir room 32 for free passage and ink may be discharged from the lower ink tap hole 33 to a recording head in response to supply of the lower part to ink.

[0016] and in the location which counters the ink feed hopper 8 and the atmospheric-air free passage end connection 9 of an ink cartridge The ink inhalant canal 34 and the atmospheric-air communicating tube 35 which equipped the point with notch 34 for ink inflow a and notch 35a for an atmospheric-air inflow are formed. It is loaded with the valve element 25 which was opening for free passage in the ink reservoir room 32 through the through tubes 36a and 36b of the case 36 which constitutes a joint unit, and was mentioned above, and the valve elements 37 and 38 which take the almost same configuration.

[0017] And in this example, that the differential pressure regulating valve for maintaining and supplying the ink of the ink reservoir room 32 to fixed negative pressure to a recording head should be constituted, a film valve 39 and the passage formation member 40 are included in a crevice 41, and the negative pressure generating room which closed and constituted that outside from a film 42 with high air barrier property is prepared. This film valve 39 is ****(ed) by valve seat 41a by the coil spring in opening 39a currently formed in this.

[0018] In this example, in the state of un-equipping a recording device with an ink cartridge 1, the closure of the through-hole 20 of the ink feed hopper 8 and the opening 22 of the atmospheric-air free passage end connection 9 is carried out by valve elements 18 and 25, respectively, and ink storage Omuro 7 is intercepted with atmospheric air. Moreover, the closure also of the connection unit 31 is carried out by valve elements 37 and 38, respectively (drawing 6 , drawing 9 (a)).

[0019] On the other hand, if the connection unit 31 is equipped with an ink cartridge 1 as shown in drawing 7 , drawing 8 , and drawing 9 (b) The ink inhalant canal 34 and the atmospheric-air communicating tube 35 fit in and move to the packing 19 and 30 of the ink feed hopper 8 and the atmospheric-air free passage end connection 9 in the process. At the tip, it is concerned with the elasticity of springs 17 and 24, and fixing which originates in solidification of ink again, and that there is nothing, to a regular location, it presses and bridgewall 18b of a valve element 18 and a pressure receiving member 27 are moved. The through-hole 20 which is open for free passage in the ink hold room 7 by this is opened wide, and the seal member 28 separates from opening 22, and a tubed part 23 and ink storage Omuro 7 are open for free passage to atmospheric air through a crevice 11 and a rill 10.

[0020] Each relative position can be set up and leakage **** of the ink at the time of wearing of an ink cartridge 1 can be prevented by Lycium chinense so that it may become the junction location of this atmospheric-air communicating tube 35 and the atmospheric-air free passage end connection 9, and a front [stage / of the valve element 18 according a valve-opening stage to the ink feed hopper 8 and the ink inhalant canal 34 in a detail more / valve-opening].

[0021] That is, also when a pressure is higher than atmospheric pressure, where ink storage Omuro's 7 air is expanding, and a clausilium condition is maintained for the valve element 18 of the ink feed hopper 8, the valve element 26 of the atmospheric-air free passage end connection 9 can be made to be able to open, and ink storage Omuro's 7 air can be missed outside. Thereby, at the time of valve opening of the continuing ink feed hopper 8, since ink is maintained by atmospheric pressure, it is prevented that ink begins to leak from the ink feed hopper 8.

[0022] From the first, in this condition, since the valve elements 37 and 38 of the connection unit 31 are also opened, respectively, supply to a recording head of ink storage Omuro's 7 ink is attained from the ink tap hole 33 via the connection unit 31 at drawing 9 (b) . In this condition, ink storage Omuro 7 of an ink cartridge 1 and the ink reservoir room 32 of the connection unit 31 can supply certainly the ink which is needed by recording head H since it is open for free passage to atmospheric air through the capillary formed with the slot 10 and the film 12, and the vaporization to the atmospheric air of the steam of the ink solvent of these rooms 7 and 32 is

prevented as much as possible.

[0023] On the other hand, if migration of a recording apparatus etc. receives change with the big posture of a cartridge 1, ink will reach the upside opening 22 and it will begin to leak from opening 22 to the free passage room 13. Since this ink flows a crevice 14, a trap is carried out in the large space of a crevice 11 and the crevice 11 is further divided by aeration film 11c, even if it does a handstand to a recording device at the time of migration or storage, it flows into a rill 10, and beginning to leak outside is prevented.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the removable ink cartridge which supplies ink to the recording head which carries out the regurgitation of the ink droplet corresponding to a printing signal.

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PRIOR ART

[Description of the Prior Art] For example, ink is held, the ink feed hopper of the container which is open for free passage to atmospheric air is equipped with tubed packing, and the ink cartridge which held the solid sphere which is always ****(ed) by means of a spring by the front face by the side of the ink room of tubed packing, and retreats by insertion of a tubed splicer is proposed in the ink cartridge which supplies ink to a recording head from an ink room through the splicer and packing which are open for free passage to a recording head so that JP,5-229137,A may see.

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained, in this invention, to as mentioned above, the base with which the ink room was formed The ink feed hopper equipped with the valve element which always maintains a clausilium condition with a spring, and opens by connection with a recording head, and supplies ink to a recording head Moreover, since the atmospheric-air free passage end connection equipped with the valve element which a clausilium condition is always maintained [valve element] with a spring, and it opens [valve element] by connection with a recording head, and makes atmospheric air open an ink room for free passage is formed Where an ink cartridge is removed from a recording device Where maintained the ink room in the seal condition by the valve element, ink began to leak, and it could prevent the vaporization of ** and an ink solvent and a recording device is equipped, a valve element is opened and an ink room can supply the ink which is opened for free passage by atmospheric air and balances consumption by the recording head.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Although according to this an ink feed hopper is closed by the solid sphere and leakage **** of ink can be prevented, even when the ink cartridge with which the recording head was once equipped is removed from a recording head, since a container is opened for free passage by atmospheric air, ink oozes out and there is a problem that the vaporization of ** and an ink solvent arises. The place which this invention is made in view of such a problem, and is made into the purpose is offering the ink cartridge which ink's begins to leak and can prevent the vaporization of ** and an ink solvent.

[0004] Moreover, other purposes of this invention are offering the ink jet recording device which performs record actuation to a recording head in response to supply of ink from the above-mentioned ink cartridge.

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MEANS

[Means for Solving the Problem] In order to solve such a technical problem the ink cartridge of this invention The ink feed hopper equipped with the valve element which always maintains a clausilium condition to the base with which the ink room was formed with a spring, and opens to it by connection with said recording head, and supplies ink to it at said recording head Moreover, the atmospheric-air free passage end connection equipped with the valve element which a clausilium condition is always maintained [valve element] with a spring, and it opens [valve element] by connection with said recording head, and makes atmospheric air open said ink room for free passage is formed.

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OPERATION

[Function] In the condition of having been removed from the recording device, where the ink room was maintained by the seal condition by the valve element and a recording device is equipped, a valve element opens and an ink room becomes possible [atmospheric air being open for free passage, and supplying ink to a recording head from an ink feed hopper].

[0007]

[Embodiment of the Invention] Then, based on the example illustrating the detail of this invention, it explains below. Drawing 1 and drawing 2 show one example of the ink cartridge of this invention with the structure of that front flesh side, respectively, and in parallel with the crevice 2 which carries out opening to one field, and the field of this opening, an ink cartridge 1 forms the ink stockroom 7 with the base 5 equipped with the upper part and the guide sections 3 and 4 which project in the path of insertion, and the film 6 which closes a crevice 2, and is constituted. The ingredient which the film 6 was deformable and equipped with air barrier property and an adhesive property by the pressure fluctuation of ink is chosen.

[0008] When a recording apparatus is equipped, the atmospheric-air free passage end connection 9 which the ink feed hopper 8 loaded with the valve mechanism mentioned later mentions later in the upper part again is formed in the location used as the lower part. The rill 10 which end 10a is punctured by the front face of the base 5 which constitutes the pars basilaris ossis occipitalis of a crevice 2 on the side face of a base 5, and other end 10b connects to crevice 11a of a major diameter moves in a zigzag direction, and is formed. Frame part 11b to which the path became thin a little is formed in the crevice 11 so that drawing 1 (b) may see, and it is divided into it with crevice 11a of the major diameter which sticks or welds breathable film 11c which has water repellence to ink here, and serves as an ink trap. As for breathable film 11c, it is desirable to have consisted of porosity films of resin [for example,] fluoride, and to have 3000 thru/or the water-repellent force 5000Pa or more higher than the ink holding power of the meniscus of the nozzle orifice of a recording head. The closure of the exposure of these rills 10 and a crevice 11 is carried out with the film 12 equipped with air barrier property and an adhesive property, and a rill 10 constitutes a capillary, and the crevice 11 constitutes the ink trap.

[0009] The crevice 11 for a free passage is connected to the free passage room 13 formed near the atmospheric-air free passage end connection 9 through the crevice 14 for connection. The crevice 14 for connection and the free passage room 13 are formed in the cross-section dimension which can secure the gap of extent returned to the free passage room 13 according to a water head difference with the liquid ink side of the ink stockroom 7, even if ink does not arrive at a crevice 11 at least according to the capillary tube force, and it obtains all of a sudden desirably and ink flows into a crevice 11.

[0010] The valve element 18 which the cross-section structure of an ink cartridge mentioned above is shown, the tubed part 16 which it has focusing on the truncated conic spring receptacle section 15 is formed in the ink feed hopper 8, and drawing 3 was energized by the coil spring 17 guided to the spring receptacle section 15 at the ink feed hopper side, and was always ****(ed) by packing 19 is inserted in movable, and the above-mentioned packing 19 which falls out to an ink feed hopper side, and serves as a stop member is fitted in. And the through-hole 20 which is

open for free passage in the ink hold room 7 where a valve element 18 is forced on the spring receptacle section 15 is drilled by this tubed part 16.

[0011] A valve element 18 forms bridgewall 18b in barrel 18a which slides on the inside of a tubed part 16, and its center section, as shown in drawing 4 , and the actuation lever and the spring receptacle section 15 from a recording head side are constituted by bridgewall 18b possible [contact].

[0012] On the other hand, through opening 21, the tubed part 23 which is open for free passage in ink storage Omuro's 7 upper part with a through tube 22 again is formed in the free passage room 13, the valve element 25 energized with the coil spring 24 by the method of outside is inserted in it, and the packing 30 which falls out to an opening side and serves as a stop member is fitted in the atmospheric-air free passage end connection 9.

[0013] As shown in drawing 4 (b), a valve element 25 The actuation lever 26 which can be inserted in opening 22, Consist of a pressure receiving member 27 and a seal member 28, and fitting of the seal member 28 is carried out to annular crevice 26b formed in major diameter 26a of the actuation lever 26. After making opening 22 penetrate thin diameter section 26c from an ink hold room side and inserting a coil spring 24 in thin diameter section 26c, it is incorporated by fixing a pressure receiving member 27 at the tip of a thin diameter section.

[0014] In addition, if the bore of opening 22 is formed smaller than the outer diameter of the seal member 28 more greatly than the outer diameter of major diameter 26a of the actuation lever 26, where the actuation lever 26 is inserted in opening 22, the seal member 28 can be fitted in an ink room side, and a coil spring 24 can be inserted in from the atmospheric-air free passage end-connection 9 side, and a pressure receiving member 27 can also be fixed.

[0015] It is constituted so that drawing 5 may show one example of the connection unit suitable for the ink cartridge mentioned above, this connection unit 31 may be connected to an ink cartridge, and atmospheric air may open the up space of the ink reservoir room 32 for free passage and ink may be discharged from the lower ink tap hole 33 to a recording head in response to supply of the lower part to ink.

[0016] and in the location which counters the ink feed hopper 8 and the atmospheric-air free passage end connection 9 of an ink cartridge The ink inhalant canal 34 and the atmospheric-air communicating tube 35 which equipped the point with notch 34for ink inflow a and notch 35a for an atmospheric-air inflow are formed. It is loaded with the valve element 25 which was opening for free passage in the ink reservoir room 32 through the through tubes 36a and 36b of the case 36 which constitutes a joint unit, and was mentioned above, and the valve elements 37 and 38 which take the almost same configuration.

[0017] And in this example, that the differential pressure regulating valve for maintaining and supplying the ink of the ink reservoir room 32 to fixed negative pressure to a recording head should be constituted, a film valve 39 and the passage formation member 40 are included in a crevice 41, and the negative pressure generating room which closed and constituted that outside from a film 42 with high air barrier property is prepared. This film valve 39 is ****(ed) by valve seat 41a by the coil spring in opening 39a currently formed in this.

[0018] In this example, in the state of un-equipping a recording device with an ink cartridge 1, the closure of the through-hole 20 of the ink feed hopper 8 and the opening 22 of the atmospheric-air free passage end connection 9 is carried out by valve elements 18 and 25, respectively, and ink storage Omuro 7 is intercepted with atmospheric air. Moreover, the closure also of the connection unit 31 is carried out by valve elements 37 and 38, respectively (drawing 6 , drawing 9 (a)).

[0019] On the other hand, if the connection unit 31 is equipped with an ink cartridge 1 as shown in drawing 7 , drawing 8 , and drawing 9 (b) The ink inhalant canal 34 and the atmospheric-air communicating tube 35 fit in and move to the packing 19 and 30 of the ink feed hopper 8 and the atmospheric-air free passage end connection 9 in the process. At the tip, it is concerned with the elasticity of springs 17 and 24, and fixing which originates in solidification of ink again, and that there is nothing, to a regular location, it presses and bridgewall 18b of a valve element 18 and a pressure receiving member 27 are moved. The through-hole 20 which is open for free passage in the ink hold room 7 by this is opened wide, and the seal member 28 separates from

opening 22, and a tubed part 23 and ink storage Omuro 7 are open for free passage to atmospheric air through a crevice 11 and a rill 10.

[0020] Each relative position can be set up and leakage **** of the ink at the time of wearing of an ink cartridge 1 can be prevented by Lycium chinense so that it may become the junction location of this atmospheric-air communicating tube 35 and the atmospheric-air free passage end connection 9, and a front [stage / of the valve element 18 according a valve-opening stage to the ink feed hopper 8 and the ink inhalant canal 34 in a detail more / valve-opening].

[0021] That is, also when a pressure is higher than atmospheric pressure, where ink storage Omuro's 7 air is expanding, and a clausilium condition is maintained for the valve element 18 of the ink feed hopper 8, the valve element 26 of the atmospheric-air free passage end connection 9 can be made to be able to open, and ink storage Omuro's 7 air can be missed outside. Thereby, at the time of valve opening of the continuing ink feed hopper 8, since ink is maintained by atmospheric pressure, it is prevented that ink begins to leak from the ink feed hopper 8.

[0022] From the first, in this condition, since the valve elements 37 and 38 of the connection unit 31 are also opened, respectively, supply to a recording head of ink storage Omuro's 7 ink is attained from the ink tap hole 33 via the connection unit 31 at drawing 9 (b). In this condition, ink storage Omuro 7 of an ink cartridge 1 and the ink reservoir room 32 of the connection unit 31 can supply certainly the ink which is needed by recording head H since it is open for free passage to atmospheric air through the capillary formed with the slot 10 and the film 12, and the vaporization to the atmospheric air of the steam of the ink solvent of these rooms 7 and 32 is prevented as much as possible.

[0023] On the other hand, if migration of a recording apparatus etc. receives change with the big posture of a cartridge 1, ink will reach the upside opening 22 and it will begin to leak from opening 22 to the free passage room 13. Since this ink flows a crevice 14, a trap is carried out in the large space of a crevice 11 and the crevice 11 is further divided by aeration film 11c, even if it does a handstand to a recording device at the time of migration or storage, it flows into a rill 10, and beginning to leak outside is prevented. Even when aeration film 11c was furthermore equipped with water repellence higher than the ink holding power of the meniscus of the nozzle orifice of a recording head, the ink stockroom 7 originates in expansion of air at least and a pressure increases, it can prevent that ink flows out of a recording head side, and begins to leak from a cartridge. In addition, even if ink flows out of the nozzle orifice of a recording head, since the closure is carried out with the cap for blinding prevention of a nozzle orifice, it will not usually become the situation which pollutes a recording device with ink.

[0024]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing (a) and (b) are drawing showing one example of the ink cartridge of this invention, respectively, and drawing expanding and showing the crevice of an ink cartridge same as the above.

[Drawing 2] It is drawing showing the structure of the rear face of an ink cartridge same as the above.

[Drawing 3] It is drawing showing the cross-section structure of an ink cartridge same as the above.

[Drawing 4] Drawing (a) and (b) are drawings showing one example of the valve element used for an ink cartridge same as the above, respectively.

[Drawing 5] It is the assembly perspective view showing one example of the connection unit by the side of the recording device with which it is equipped with an ink cartridge same as the above.

[Drawing 6] It is drawing showing the cross-section structure of one example of the connection unit suitable for the recording device which uses an ink cartridge same as the above.

[Drawing 7] It is the sectional view showing the condition of having equipped the connection unit with the ink cartridge same as the above.

[Drawing 8] Drawing (a) and (b) are the sectional views expanding and showing the condition of the valve element of the atmospheric-air free passage end connection in the condition of having equipped the connection unit with the ink cartridge, respectively, and an ink feed hopper.

[Drawing 9] Drawing (a) and (b) are drawings showing typically the passage structure in the condition and the wearing condition that a connection unit is not equipped with an ink cartridge same as the above, respectively.

[Description of Notations]

1 Ink Cartridge

3 Four Guide section

5 Base

6 12 Film

7 Ink Storage Omuro

7a Areole

8 Ink Feed Hopper

9 Atmospheric-Air Free Passage End Connection

10 Rill

11 Crevice for Free Passage

11c Aeration film

13 Free Passage Room

14 Crevice for Connection

15 Spring Receptacle Section

16 23 Tubed part

17 24 Coil spring

19 30 Packing

18 25 Valve element
20 Through-hole
21 Opening
26 Actuation Lever
26b Annular crevice
26c Thin diameter section
27 Pressure Receiving Member
28 Seal Member
31 Connection Unit

[Translation done.]

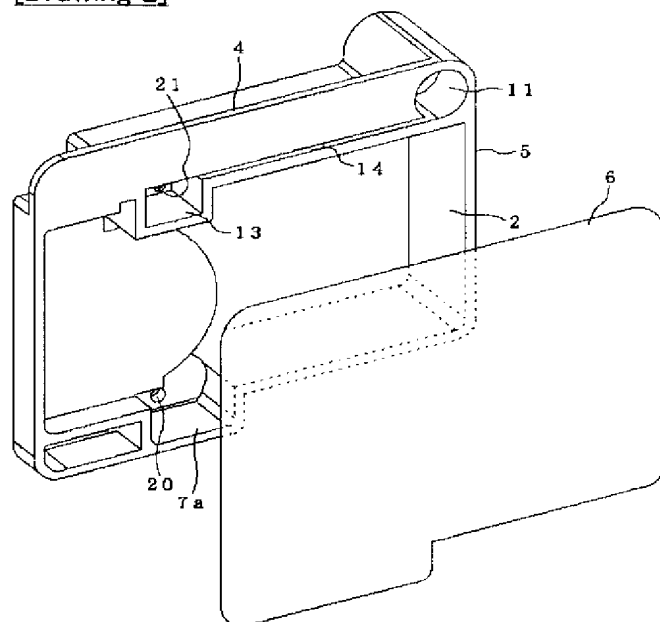
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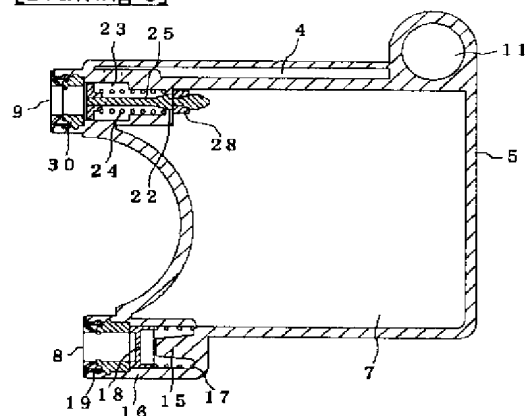
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DRAWINGS

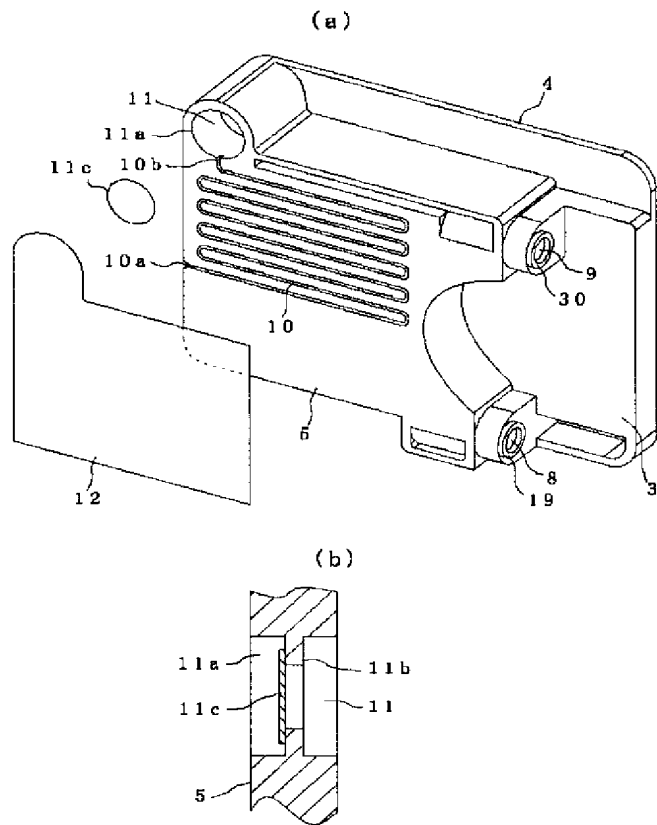
[Drawing 2]



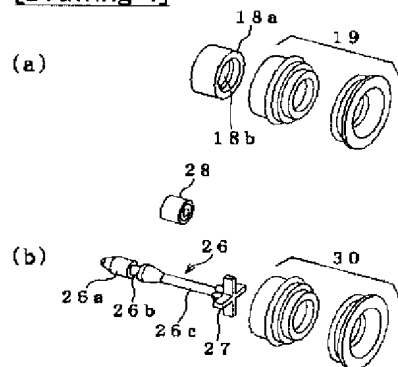
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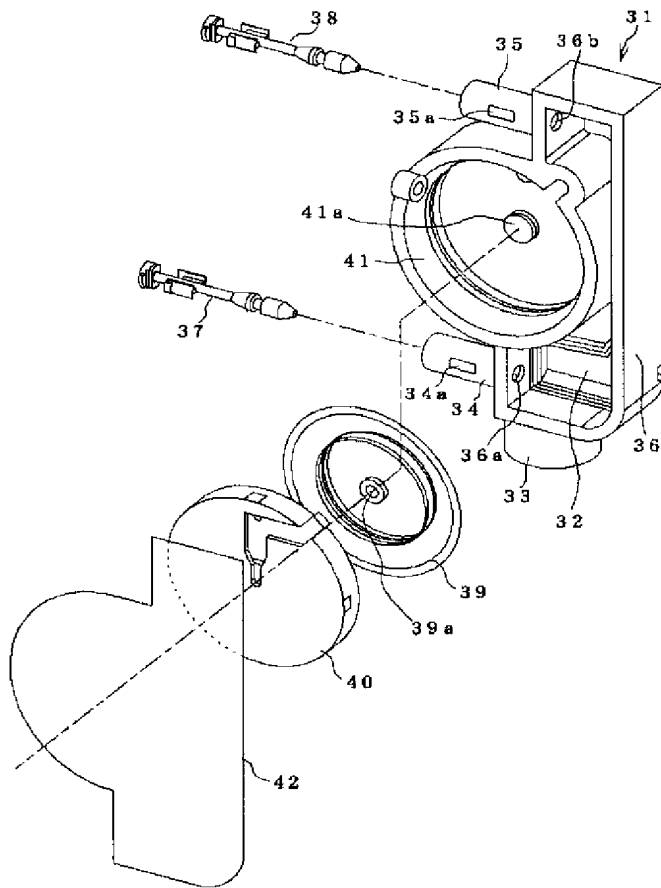
[Drawing 1]



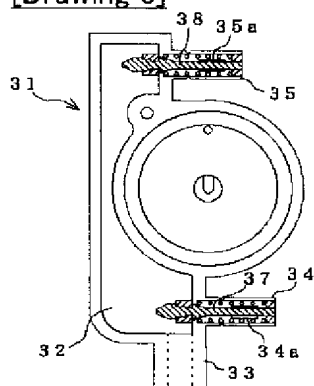
[Drawing 4]



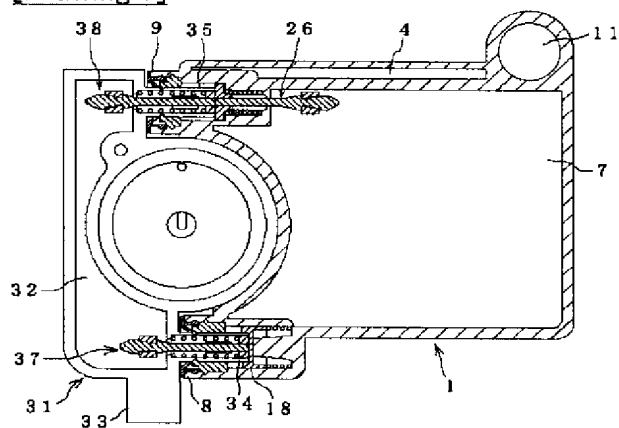
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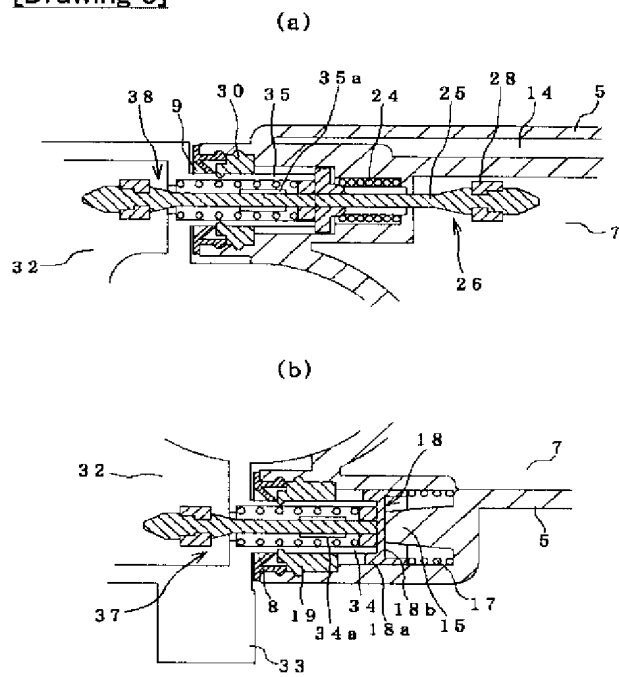
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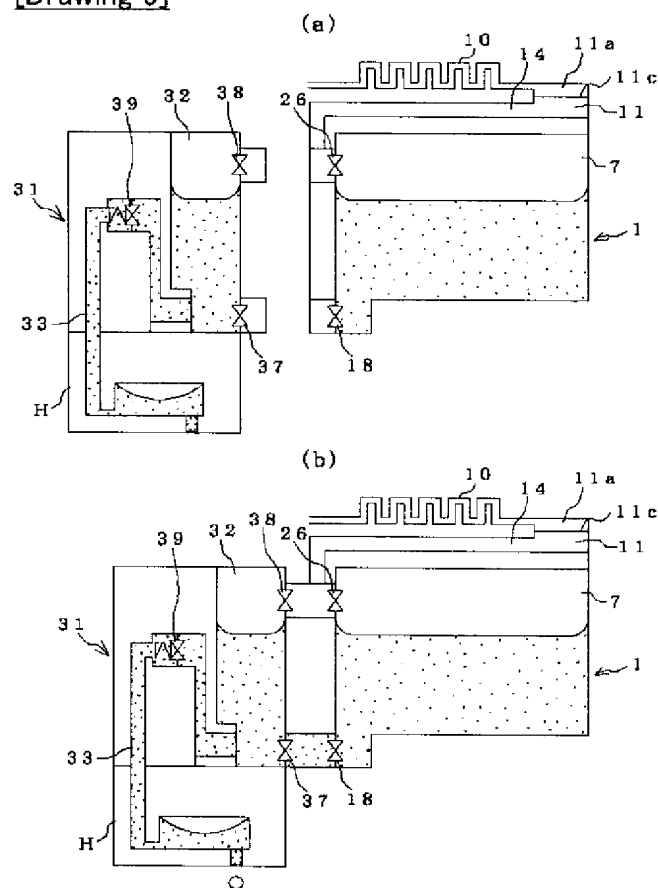
[Drawing 7]



[Drawing 8]



[Drawing 9]



[Translation done.]

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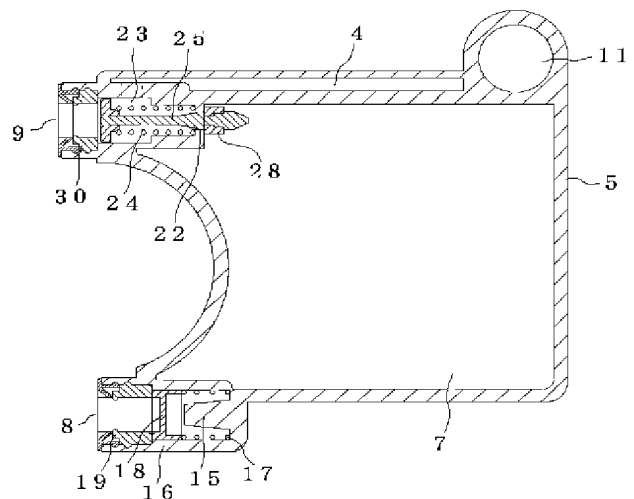
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(54) 【発明の名称】 インクジェット記録装置用インクカートリッジ、及びインクジェット記録装置

(57) 【要約】

【課題】 インクの漏れ出しや、インク溶媒の揮散を防止することができる着脱可能なインクカートリッジを提供すること。

【解決手段】 インク貯蔵大室7が形成された基体5に、常時バネ17により閉弁状態を維持し、かつ記録ヘッドとの接続により開弁する弁体18を備えたインク供給口8と、常時バネ24により閉弁状態を維持し、かつ記録ヘッドとの接続により開弁してインク貯蔵大室7を大気に連通させる弁体26とを備える。



【特許請求の範囲】

【請求項1】 インク室が形成された基体に、常時バネにより閉弁状態を維持し、かつ前記記録ヘッドとの接続により開弁して前記記録ヘッドにインクを供給する弁体を備えたインク供給口が、また常時バネにより閉弁状態を維持し、かつ前記記録ヘッドとの接続により開弁して前記インク室を大気に連通させる弁体を備えた大気連通接続口が形成されているインクジェット記録装置用インクカートリッジ。

【請求項2】 前記インク室が、前記基体の一方の面に開口する凹部を形成し、前記凹部をインクの圧力変動を受けて変形し、かつ遮気性を備えたフィルムにより封止して構成されている請求項1に記載のインクジェット記録装置用インクカートリッジ。

【請求項3】 前記記録ヘッドに接続される過程で、前記大気連通接続口が、前記インク供給口よりも先に開弁される請求項1に記載のインクジェット記録装置用インクカートリッジ。

【請求項4】 前記大気連通接続口が、前記基体の表面に形成された細溝をフィルムにより封止して形成されたキャピラリを介して大気に連通されている請求項1に記載のインクジェット記録装置用インクカートリッジ。

【請求項5】 前記キャピラリと前記大気連通接続口とが、毛細管力によりインクを保持して前記キャピラリにインクを到達させない程度の間隙を備えた流路を介して接続されている請求項4に記載のインクジェット記録装置用インクカートリッジ。

【請求項6】 前記キャピラリの端部が、撥水性膜により封止されたインクトラップ室に接続されている請求項4に記載のインクジェット記録装置用インクカートリッジ。

【請求項7】 前記撥水性膜が、前記記録ヘッドのノズル開口のメニスカス保持力よりも高い撥水力を有する請求項6に記載のインクジェット記録装置用インクカートリッジ。

【請求項8】 前記記録ヘッドに接続されたとき下部となる領域に、前記インク供給口に連通する小室が形成されている請求項1に記載のインクジェット記録装置用インクカートリッジ。

【請求項9】 前記インク供給口には、裁頭円錐状のバネ受け部を中心に有する筒状部が形成されていて、前記バネ受け部にガイドされたコイルバネにインク供給口側に付勢された仕切り壁を備えた円筒状の弁体が装填されている請求項1に記載のインクジェット記録装置用インクカートリッジ。

【請求項10】 前記大気連通接続口には、貫通孔により前記キャピラリに連通し、かつ前記インク室側に開口する筒状部が形成され、前記開口をコイルバネにより外方に付勢された弁体が嵌め込まれている請求項1に記載のインクジェット記録装置用インクカートリッジ。

【請求項11】 インク室が形成された基体に、常時バネにより閉弁状態を維持し、かつ前記記録ヘッドとの接続により開弁して前記記録ヘッドにインクを供給する弁体を備えたインク供給口が、また常時バネにより閉弁状態を維持し、かつ前記記録ヘッドとの接続により開弁して前記インク室を大気に連通させる弁体を備えた大気連通接続口が形成されているインクジェット記録装置用インクカートリッジと、

前記インクカートリッジが装着されたとき、前記弁体のそれぞれを開弁させる作動部材と、前記インク供給口に連通して前記記録ヘッドにインクを供給する流路の途中に、前記記録ヘッド側が所定の負圧になったとき開弁する差圧弁を備えた接続ユニットとからなるインクジェット記録装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、印刷信号に対応してインク滴を吐出する記録ヘッドにインクを供給する着脱可能なインクカートリッジに関する。

【0002】

【従来の技術】例えば、特開平5-229137号公報に見られるように、インクを収容し、大気に連通する容器のインク供給口に筒状パッキンを備え、記録ヘッドに連通する接続具とパッキンを介してインク室から記録ヘッドにインクを供給するインクカートリッジにおいて、筒状パッキンのインク室側の表面にバネで常時弾接され、かつ筒状の接続具の挿入により後退する球体を収容したインクカートリッジが提案されている。

【0003】

【発明が解決しようとする課題】これによれば、いったん記録ヘッドに装着されたインクカートリッジを記録ヘッドから取り外した場合でも球体によりインク供給口を封止してインクの漏れ出しを防止できるものの、容器が大気に連通されたままであるため、インクの染み出しや、またインク溶媒の揮散が生じるという問題がある。本発明は、このような問題に鑑みてなされたものであって、その目的とするところは、インクの漏れ出しや、インク溶媒の揮散を防止することができるインクカートリッジを提供することである。

【0004】また本発明の他の目的は、上記インクカートリッジから記録ヘッドにインクの供給を受けて記録動作を行うインクジェット記録装置を提供することである。

【0005】

【課題を解決するための手段】このような課題を解決するために本発明のインクカートリッジは、インク室が形成された基体に、常時バネにより閉弁状態を維持し、かつ前記記録ヘッドとの接続により開弁して前記記録ヘッドにインクを供給する弁体を備えたインク供給口が、また常時バネにより閉弁状態を維持し、かつ前記記録ヘッ

ドとの接続により開弁して前記インク室を大気に連通させる弁体を備えた大気連通接続口が形成されている。

【0006】

【作用】記録装置から取り外された状態では、インク室が弁体により密封状態に維持され、また記録装置に装着された状態では、弁体が開弁してインク室が大気に連通されてインク供給口からインクを記録ヘッドに供給することが可能となる。

【0007】

【発明の実施の形態】そこで以下に本発明の詳細を図示した実施例に基づいて説明する。図1、図2は、それぞれ本発明のインクカートリッジの一実施例を、その表裏の構造で示すものであって、インクカートリッジ1は、一方の面に開口する凹部2と、この開口の面に平行に上部と、挿入方向に突出するガイド部3、4とを備えた基体5と、凹部2を封止するフィルム6とによりインク貯蔵室7を形成して構成されている。フィルム6は、インクの圧力変動により変形可能で、かつ遮気性と接着性を備えた材料が選択されている。

【0008】記録装置に装着されたとき下部となる位置には後述するバルブ機構が装填されたインク供給口8が、また上部には後述する大気連通接続口9が形成されている。凹部2の底部を構成する基体5の表面には一端10aが基体5の側面に開孔され、また他端10bが大径の凹部11aに接続する細溝10が蛇行して形成されている。凹部11には、図1(b)に見られるように若干径が細くなった杵部11bが形成されていて、ここにインクに対して撥水性を有する通気性フィルム11cを貼着または溶着してインクトラップとなる大径の凹部11aと仕切られている。通気性フィルム11cは、例えばフッ化樹脂の多孔質フィルムから構成され、記録ヘッドのノズル開口のメニスカスのインク保持力よりも高い、3000乃至5000Pa以上の撥水力を備えているのが望ましい。これら細溝10及び凹部11の露出面は、遮気性と接着性を備えたフィルム12により封止されて、細溝10がキャピラリを構成し、また凹部11がインクトラップを構成している。

【0009】連通用凹部11は、大気連通接続口9の近傍に形成された連通室13に接続用凹部14を介して接続されている。接続用凹部14と連通室13は、毛細管力により少なくともインクが凹部11に到達せず、かつ望ましくはたとえインクが凹部11に流入したとしても、インク貯蔵室7のインク液面との水頭差により連通室13に戻される程度の間隙を確保できる断面寸法に形成されている。

【0010】図3は、上述したインクカートリッジの断面構造を示すものであって、インク供給口8には裁頭円錐状のバネ受け部15を中心とする筒状部16が形成されていて、バネ受け部15にガイドされたコイルバネ17にインク供給口側に付勢されてパッキン19に常時

弾接された弁体18が移動可能に嵌め込まれており、インク供給口側に抜け止め部材を兼ねる前述のパッキン19が嵌装されている。そして、この筒状部16には、弁体18がバネ受け部15に押し付けられた状態でインク収容室7に連通する通路20が穿設されている。

【0011】弁体18は、図4に示したように筒状部16の内面を摺動する筒体18aと、その中央部に仕切り壁18bを形成して、記録ヘッド側からの作動杆と、バネ受け部15とが仕切り壁18bに当接可能に構成されている。

【0012】一方、大気連通接続口9には、開口21を介して連通室13に、また貫通孔22によりインク貯蔵大室7の上部に連通する筒状部23が形成されていて、コイルバネ24により外方に付勢された弁体25が嵌め込まれていて、開口側に抜け止め部材を兼ねるパッキン30が嵌装されている。

【0013】弁体25は、図4(b)に示したように開口22に挿入可能な作動杆26と、受圧部材27と、シール部材28とからなり、作動杆26の大径部26aに形成された環状凹部26bにシール部材28を嵌合させ、細径部26cを、インク収容室側から開口22に貫通させ、細径部26cにコイルバネ24を嵌め込んでから、細径部の先端に受圧部材27を固定することにより組み込まれている。

【0014】なお、開口22の内径を作動杆26の大径部26aの外径よりも大きく、かつシール部材28の外径よりも小さく形成すると、開口22に作動杆26を挿通した状態でインク室側にシール部材28を嵌装し、また大気連通接続口9側からコイルバネ24を挿通して受圧部材27を固定することもできる。

【0015】図5は、上述したインクカートリッジに適した接続ユニットの一実施例を示すものであって、この接続ユニット31は、インクカートリッジに接続されてインク溜め室32の上部空間を大気に連通され、また下部からインクの供給を受けて、下部のインク流出口33から記録ヘッドにインクを排出するように構成されている。

【0016】そして、インクカートリッジのインク供給口8、及び大気連通接続口9に対向する位置には、先端部にインク流入用切欠き部34a、大気流入用の切欠き部35aを備えたインク流入管34、大気連通管35が形成されていて、結合ユニットを構成するケース36の貫通孔36a、36bを介してインク溜め室32に連通しており、また前述した弁体25とはほぼ同一の構成を採る弁体37、38が装填されている。

【0017】そしてこの実施例においては、インク溜め室32のインクを記録ヘッドに対して一定の負圧に維持して供給するための差圧弁を構成すべく、膜弁39、流路形成部材40を凹部41に組み込んで、その外側を遮気性の高いフィルム42で封止して構成した負圧発生室

が設けられている。この膜弁39は、これに形成されている開口39aをコイルスプリングにより弁座41aに弾接されている。

【0018】この実施例において、インクカートリッジ1が記録装置に未装着の状態では、インク供給口8の通路20、及び大気連通接続口9の開口22がそれぞれ弁体18、25により封止され、インク貯蔵大室7が大気と遮断されている。また、接続ユニット31もそれぞれ弁体37、38により封止されている(図6、図9(a))。

【0019】一方、図7、図8、及び図9(b)に示すように、インクカートリッジ1を接続ユニット31に装着すると、その過程でインク流入管34、及び大気連通管35が、インク供給口8、及び大気連通接続口9のパッキン19、30に嵌合して移動し、その先端で弁体18の仕切り壁18b、及び受圧部材27をバネ17、24の弾性や、またインクの固化に起因する固着に関わりなく規定の位置まで押圧、移動させる。これによりインク収容室7に連通する通路20が開放され、またシール部材28が開口22から離れて筒状部23及びインク貯蔵大室7が凹部11及び細溝10を介して大気に連通する。

【0020】この大気連通管35と大気連通接続口9との接合位置、より詳細には開弁時期を、インク供給口8とインク流入管34とによる弁体18の開弁時期よりも前となるように、それぞれの相対位置を設定しておくことにより、インクカートリッジ1の装着時のインクの漏れ出しを防止することができる。

【0021】すなわち、インク貯蔵大室7の空気が膨張していて大気圧よりも圧力が高い場合にも、インク供給口8の弁体18を閉弁状態を維持させた状態で、大気連通接続口9の弁体26を開弁させてインク貯蔵大室7の空気を外部に逃がすことができる。これにより、引き続きインク供給口8の開弁時には、インクが大気圧に維持されているから、インク供給口8からインクが漏れ出すのを防止される。

【0022】もとより、この状態では接続ユニット31の弁体37、38もそれぞれ開弁されているから、図9(b)にインク貯蔵大室7のインクは、接続ユニット31を経由してインク流出口33から記録ヘッドに供給可能となる。この状態では、インクカートリッジ1のインク貯蔵大室7及び接続ユニット31のインク溜め室32は、溝10とフィルム12により形成されたキャピラリを介して大気に連通しているから、記録ヘッドHで必要となるインクを確実に供給することができ、またこれら室7、32のインク溶媒の蒸気の大気への揮散が可及的に防止される。

【0023】一方、記録装置の移動等によりカートリッジ1の姿勢が大きな変化を受けると、上部の開口22にインクが到達して、開口22から連通室13に漏れ出

す。このインクは凹部14を流れて凹部11の広い空間でトラップされ、さらに凹部11が通気フィルム11cにより分割されているため、記録装置に移動や保管時に倒立したとしても細溝10に流れ込み、外部に漏れ出すのが防止される。さらに通気フィルム11cが、記録ヘッドのノズル開口のメニスカスのインク保持力よりも高い撥水性を備えていると、少なくともインク貯蔵室7が空気の膨張に起因して圧力が高まった場合でも、インクは記録ヘッド側から流出してカートリッジから漏れ出すのを防止することができる。なお、たとえ記録ヘッドのノズル開口からインクが流出しても、通常は、ノズル開口の目詰まり防止のためのキャップで封止されているから、記録装置をインクで汚染するような事態にはならない。

【0024】一方、凹部11にまで流れ込んだインクは、インクカートリッジが元の正規の姿勢に戻されると、間隙が大きく、毛細管力を発現しない凹部14を流れて連通室13に重力で移動し、開口22からインク貯蔵大室7に戻る。

【0025】このようにして、インクの消費が進むと、インク貯蔵大室7の底部の小室7aにインクが集まるから、インクレベルが通路20よりも上に維持されてほぼ最後までインクを記録ヘッドに供給することができる。

【0026】一方、印刷媒体等の交換に伴って装着されているインクカートリッジを交換する場合には、インクカートリッジ1を接続ユニット31から取り外すと、インク流入管34、及び大気連通管35が引き抜かれるため、インク供給口8、及び大気連通接続口9の弁体18及び弁体25がバネ17、24により押し戻されてインク収容室7に連通する通路20、及び開口22を封止し、インク貯蔵大室7のインクや、インク溶媒の漏れ出しや揮散が防止される。

【0027】なお、上述の実施例においては、インク供給口、及び大気連通接続口を、それぞれ記録装置に装着されたとき、下部、及び上部となる位置に設けているが、インク供給口は、流路を介してインク室のインクに、また大気連通接続口は、流路を介して非インク存在領域に連通されていれば、その位置に関係なく同様の作用を奏することは明らかである。

【0028】また、上述の実施例においては、負圧発生手段を備えた接続ユニット31を介して記録ヘッドに装着する場合について説明したが、記録ヘッドのノズル開口のメニスカスのインク保持力が高い場合には負圧発生手段を介することなく接続できることは明らかである。

【0029】

【発明の効果】以上、説明したように本発明においては、インク室が形成された基体に、常時バネにより閉弁状態を維持し、かつ記録ヘッドとの接続により開弁して記録ヘッドにインクを供給する弁体を備えたインク供給口が、また常時バネにより閉弁状態を維持し、かつ記録

ヘッドとの接続により開弁してインク室を大気に連通させる弁体を備えた大気連通接続口が形成されているので、インクカートリッジが記録装置から取り外された状態では、インク室を弁体により密封状態に維持してインクの漏れ出しや、インク溶媒の揮散を防止でき、また記録装置に装着した状態では弁体が開弁され、インク室が大気に連通されて記録ヘッドでの消費に見合うインクを供給することができる。

【図面の簡単な説明】

【図1】図(a)、(b)は、それぞれ本発明のインクカートリッジの一実施例を示す図と、同上インクカートリッジの凹部を拡大して示す図である。

【図2】同上インクカートリッジの裏面の構造を示す図である。

【図3】同上インクカートリッジの断面構造を示す図である。

【図4】図(a)、(b)は、それぞれ同上インクカートリッジに使用する弁体の一実施例を示す図である。

【図5】同上インクカートリッジが装着される記録装置側の接続ユニットの一実施例を示す組立斜視図である。

【図6】同上インクカートリッジを使用する記録装置に適した接続ユニットの一実施例の断面構造を示す図である。

【図7】同上インクカートリッジを接続ユニットに装着した状態を示す断面図である。

【図8】図(a)、(b)は、それぞれインクカートリッジを接続ユニットに装着した状態での大気連通接続口及びインク供給口の弁体の状態を拡大して示す断面図である。

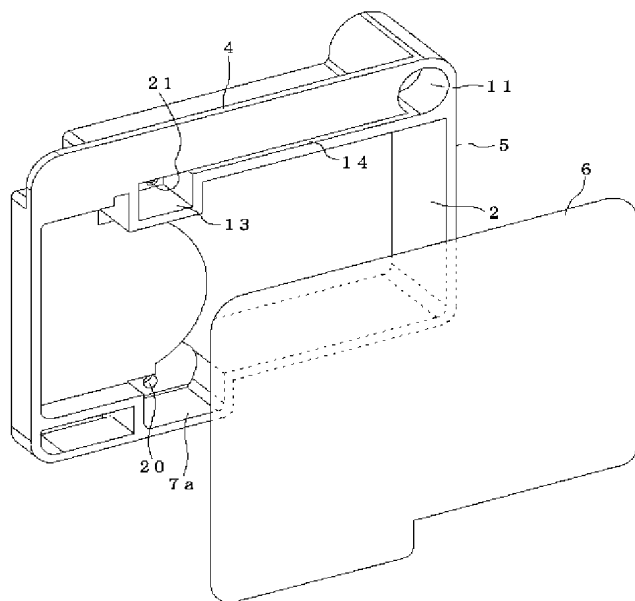
【図9】図(a)、(b)は、それぞれ同上インクカー

トリッジが接続ユニットに非装着の状態、及び装着状態での流路構造を模式的に示す図である。

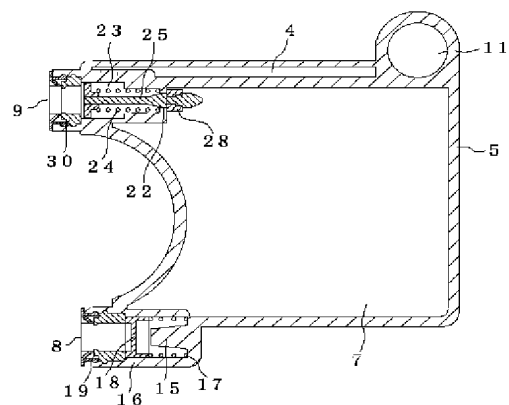
【符号の説明】

- 1 インクカートリッジ
- 3、4 ガイド部
- 5 基体
- 6、12 フィルム
- 7 インク貯蔵大室
- 7a 小室
- 8 インク供給口
- 9 大気連通接続口
- 10 細溝
- 11 連通用凹部
- 11c 通気フィルム
- 13 連通室
- 14 接続用凹部
- 15 バネ受け部
- 16、23 筒状部
- 17、24 コイルバネ
- 19、30 パッキン
- 18、25 弁体
- 20 通孔
- 21 開口
- 26 作動杆
- 26b 環状凹部
- 26c 細径部
- 27 受圧部材
- 28 シール部材
- 31 接続ユニット

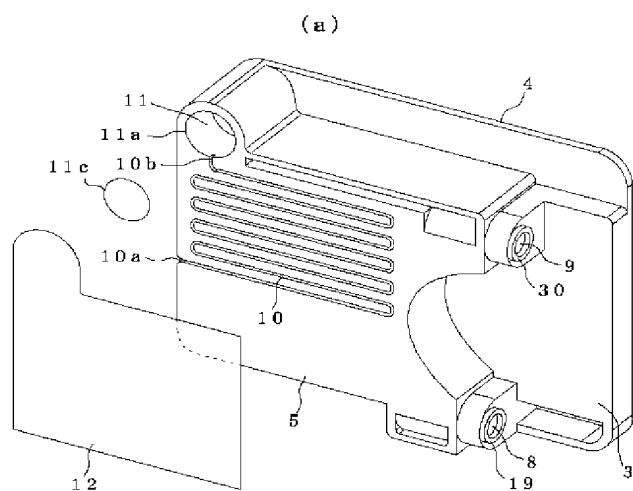
【図2】



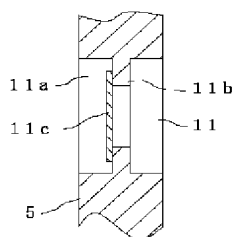
【図3】



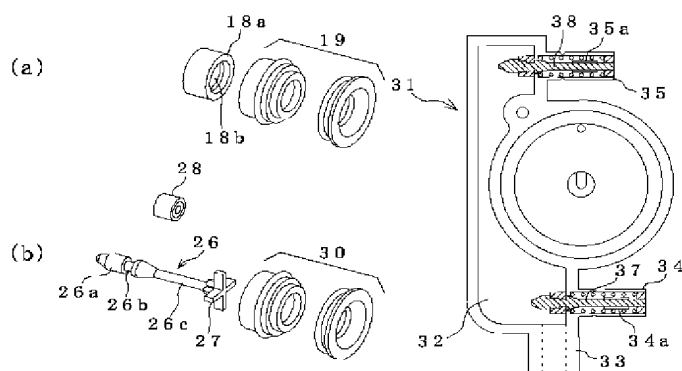
【図1】



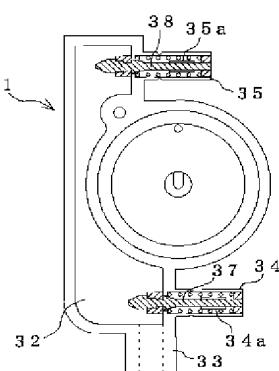
(b)



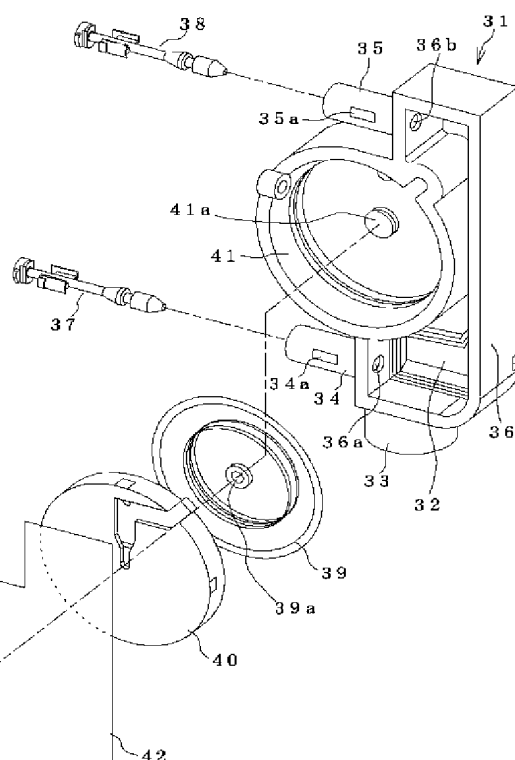
【図4】



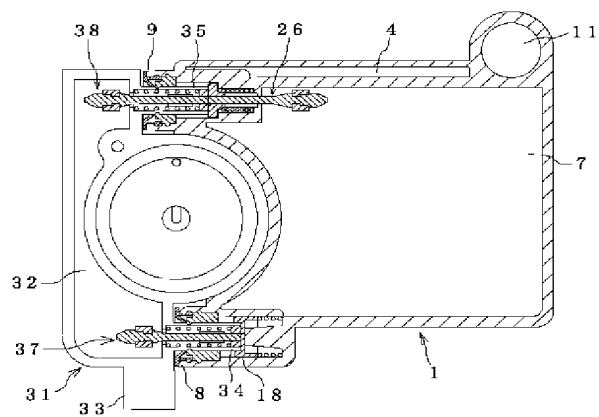
【図6】



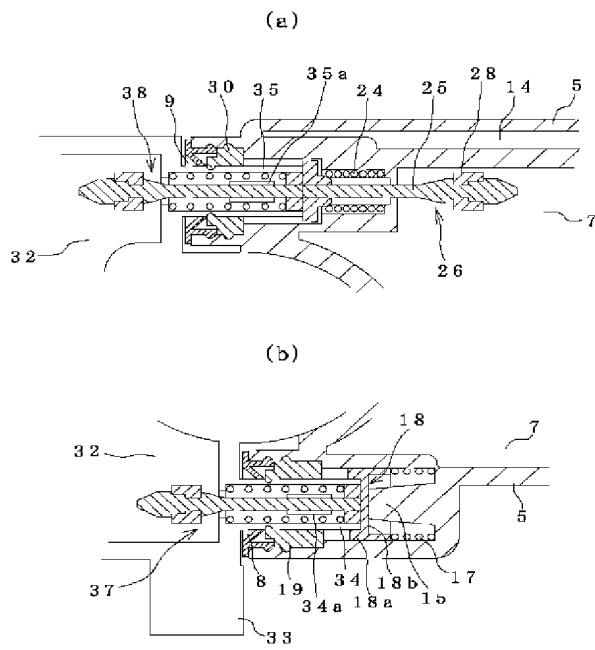
【図5】



【図7】



【図8】



【図9】

